

Can Pediatric Bispectral Index Sensor Replace Adult Bispectral Index Sensor for Depth of Anesthesia Monitoring?

Sir,

We report a 53-year-old male with left partial brachial plexus injury posted for exploration and repair under general anesthesia. He was apparently well few days back when he met with an accident following which he developed weakness of the left upper arm. There was no history of loss of consciousness, seizures, nausea, or vomiting. General anesthesia was induced with fentanyl (2 mcg/kg), propofol (2 mg/kg), and rocuronium (1 mg/kg). The airway was secured with laryngeal mask airway size 3. Total intravenous anesthesia (TIVA) was used for maintenance (Propofol @ 100 mcg/kg/min) keeping in mind intraoperative nerve monitoring. Depth of anesthesia was monitored with adult bispectral index (BIS) sensor, applied to the forehead immediately after induction of anesthesia to avoid the incidence of awareness intraoperatively. The monitor displayed a perfect BIS picture with BIS value of 48 with signal quality index (SQI) of 100% and electromyogram (EMG) of 10 decibel (dB) under TIVA. After getting above values, adult BIS sensor was replaced by pediatric sensor on same site under same anesthetic regimen to find out the difference in BIS values between two if any. This time monitor displayed the same BIS value of 48 with SQI of 80% and EMG of 10 dB. Pediatric sensor displayed same BIS value as an adult sensor, but the quality of electroencephalographic (EEG) signals was found to be slightly less compared to an adult. EMG, however, displayed similar value with both sensors.

BIS is the first and most studied monitor till date for monitoring depth of anesthesia. There are many clinical trials and comparative studies where they have examined the impact of BIS monitor on intraoperative awareness.^[1-3] Use of intraoperative BIS monitoring not only reduces the incidence of intraoperative awareness but also decreases the overall consumption of anesthetic drugs, postoperative nausea and vomiting and improves postoperative recovery as well.^[4] Low BIS in isolation is found to have lower incidence of postoperative mortality compared to triple low state (low BIS <45, low minimal alveolar concentration <0.7%, and low mean arterial pressure <75) which can lead to higher incidence of postoperative mortality rate.^[5] However, according to a recent retrospective study, there is a weak association between the triple low state and postoperative mortality.^[6] BIS index is created from processed EEG signals obtained from patients forehead, which then undergo specific type of proprietary algorithm where all artifacts are removed and finally an index is created to give a value between 0 (no brain activity) to 100 (awake). The recommended range of BIS under general anesthesia is between 40 and 60 with

lowest probability of awareness with recall. Through our case report, we would like to an emphasis on the fact that both pediatric and adult sensors receive raw EEG signals from patients' forehead and send them to the device for mathematical processing to finally create a normalized index. Hence, one can use pediatric BIS sensor in place of adult BIS sensor to monitor depth of anesthesia. The quality of EEG signals however found to be slightly lower compared to adult sensor (SQI: 80% [pediatric] compared to SQI: 90% [adult]) but in an acceptable range to give a good BIS picture. The cause of poor quality EEG could be smaller size of pediatric BIS sensors leading to decreased skin conductance. Since our case report has enrolled a single patient, so citation should be done cautiously. Further large clinical trials are required to draw a strong conclusion on this topic.

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Conflicts of interest

There are no conflicts of interest.

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